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(54) LATENT IMAGE RECORDING MEDIUM AND ITS PRODUCTION

(57)Abstract:
PROBLEM TO BE SOLVED: To obtain a latent image recording medium in which letters or an image is not recognized when the medium is observed under natural light but letters or an image with multicolor display can be recognized when the medium is observed through a polarizing plate or under irradiation with linearly polarized light.

SOLUTION: The latent image recording medium 10 comprises a substrate 11, three dichroic dye layers 14, 16 and 18 different from one another in color formed on the substrate 11 and mutual contamination preventing layers 15 and 17 separately formed between the dichroic dye layers 14 and 16 and between the dichroic dye layers 16 and 18. Each of the dichroic dye layers has been patterned with an anisotropically oriented dichroic dye. When the latent image recording medium 10 is observed under natural light, letters or an image is not recognized, but when the medium 10 is observed through a polarizing plate disposed in the horizontal or perpendicular direction, the patterned parts assume different colors and letters or an image is recognized because the polarized component of transmitted light has deviation.

CLAIMS

[Claim(s)]
[Claim 1]A latent image recording medium recording polarization information which a two or more layers dichroism pigment layer which consists of dichroism pigments is laminated, and is different in each dichroism pigment layer.
[Claim 2]A latent image recording medium providing two or more said layers which prevent mutual contamination of an up-and-down dichroism pigment layer between dichroism pigment layers of a layer in Claim 1.
[Claim 3]an orienting film and a dichroism pigment layer which control orientation of a dichroism pigment -- alternation -- and a latent image recording medium having laminated at least 2 sets by a color which is mutually different, and recording polarization information which is different in said two chromatic nature each pigment layer.
[Claim 4]A latent image recording medium, wherein said orienting film which controls orientation of a dichroism pigment in Claim 3 is a rubbing orienting film.
[Claim 5]A latent image recording medium, wherein orientation of said dichroism pigment is carried out by being applied on said rubbing orienting film in Claim 4.
[Claim 6]A latent image recording medium, wherein said orienting film is formed in Claim 3, and 4 or 5 from material which prevents mutual contamination of an up-and-down dichroism pigment layer.
[Claim 7]A latent image recording medium having laminated two or more dichroism pigment layers by which orientation of a dichroism pigment was controlled by a color which is mutually different, and recording polarization information which is different in said two chromatic nature each pigment layer.
[Claim 8]A latent image recording medium, wherein said dichroism pigment layer adds shearing to a dichroism pigment and the orientation is controlled in Claim 7.
[Claim 9]A latent image recording medium having laminated by turns an orienting film and two or more sets of hardenability liquid crystal layers containing a dichroism pigment, and recording polarization information which is different in a hardenability liquid crystal layer containing each dichroism pigment.
[Claim 10]A latent image recording medium characterized by said orienting film being a photo-alignment film in Claim 9.
[Claim 11]A latent image recording medium characterized by said hardenability liquid crystal layer being either an ultraviolet curing nature liquid crystal layer or an electron beam hardenability liquid crystal layer in Claim 9 or 10.
[Claim 12]A latent image recording medium, wherein the spectral characteristics of said two chromatic nature each coloring matter differ for each class in either of the Claims 1-11.
[Claim 13]A latent image recording medium characterized by a color of a dichroism pigment in said two or more layers being either among yellow, magenta, and cyanogen in either of the Claims 1-11.
[Claim 14]A process of applying a dichroism pigment and forming a dichroism pigment layer on a substrate, and a process which add shearing to said dichroism pigment layer and to which orientation of the dichroism pigment molecule is carried out anisotropically are repeated for every dichroism pigment molecule of at least two kinds of different colors, A manufacturing method of a latent image recording medium recording polarization information which is different in each dichroism pigment layer.
[Claim 15]A process of applying a dichroism pigment and forming a dichroism pigment layer on a substrate, and a process which add shearing to said dichroism pigment layer and to which

orientation of the dichroism pigment molecule is carried out anisotropically, A process of applying a layer which prevents mutual contamination between dichroism pigment layers laminated to said dichroism pigment layer by which orientation was carried out anisotropically, A manufacturing method of a latent image recording medium becoming by ******, repeating these processes for every dichroism pigment molecule of at least two kinds of different colors, and recording polarization information which is different in each dichroism pigment layer.

[Claim 16]A process of applying on a substrate an orienting film which has a function to prevent mutual contamination of a dichroism pigment layer, A process of carrying out orientation treatment of the orienting film by rubbing, and a process of applying a dichroism pigment and forming a dichroism pigment layer on this orienting film by which orientation treatment was carried out, A manufacturing method of a latent image recording medium recording polarization information which became by ******, repeated these processes for every dichroism pigment molecule of at least two kinds of different colors, and is different in each dichroism pigment layer.

[Claim 17]A process of applying a photo-alignment film on a substrate, and a process of patterning by a photo-alignment film irradiating with linear polarization or slanting unpolarized light of wavelength which reveals orientation performance via a photo mask, A process of applying a hardenability liquid crystal containing a dichroism pigment, and a process which stiffens a hardenability liquid crystal by ultraviolet rays or electron beam irradiation, A manufacturing method of a latent image recording medium repeatedly characterized by recording polarization information which is different in a hardenability liquid crystal containing each dichroism pigment for every hardenability liquid crystal layer which becomes by ****** and includes these processes for a dichroism pigment of at least two kinds of different colors.

[Claim 18]A manufacturing method of a latent image recording medium, wherein the spectral characteristics of each of said dichroism pigment differ for each class in either of the Claims 14-17.

[Claim 19]A manufacturing method of a latent image recording medium characterized by a color of a dichroism pigment in said two or more layers being either among yellow, magenta, and cyanogen in either of the Claims 14-18.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]When this invention starts a latent image recording medium and a manufacturing method for the same and it observes under available light especially, can recognize neither a character nor a picture, but. When the time of observing through a polarizing plate and linear polarization are irradiated with and observed, it is related with a latent image recording medium which can recognize the character and picture of a multicolor display, and a manufacturing method for the same.

[0002]

[Description of the Prior Art]In order to enable it to recognize although neither a character nor a picture can be recognized under available light only after there is a special stimulus from the outside, such as ultraviolet rays and polarization, The method of using the multiaxial polarizing element using the dichroism pigment indicated to printing and JP,H7-261024,A of fluorescent ink, and JP,H9-183287,A is known.

[0003]Said fluorescent ink is ink which absorbs ultraviolet rays and generates visible light, and is used for ROTSU ******, distribution management, etc. of goods. The multiaxial light

polarizer using said dichroism pigment is the method that a character and a picture can be recognized for the first time, by irradiating with linear polarization.
The application to goods, the forgery prevention use of a security, the discriminating method of an authentic article, etc. is proposed.

[0004]
[Problem(s) to be Solved by the Invention]In printing of the former fluorescent ink, although a multicolor display is possible by printing fluorescent ink of a different kind many times, if the conversion efficiency to the visible light of ultraviolet rays is bad and is not a dark place, there is a problem that neither a character nor a picture can be recognized.
[0005]Although the multiaxial polarizing element using said dichroism pigment can recognize a character and a picture easily by the linear polarization exposure of visible light, since it is monolayer composition, there is a problem that a multicolor display cannot be performed.
[0006]As mentioned above, when it observes under available light, neither the character nor the picture has been recognized, but when it let a **** board pass or linear polarization was irradiated with and observed, the method of recognizing the character and picture of a multicolor display was not known conventionally.
[0007]It aims at being able to recognize neither a character nor a picture, when this invention is observed under available light, but providing a latent image recording medium which can recognize the character and picture of a multicolor display, and a manufacturing method for the same, when it lets a polarizing plate pass or linear polarization is irradiated with and observed.
[0008]
[Means for Solving the Problem]By this invention person's laminating a two or more layers hardenability liquid crystal containing a dichroism pigment in which a dichroism pigment layer from which the spectral characteristic differs differs from the spectral characteristic as a result of repeating research wholeheartedly that these SUBJECT should be solved, and recording polarization information which is different in each layer, When it observes under available light, neither a character nor a picture can be recognized, but when a time of observing through a polarizing plate and linear polarization were irradiated with and observed, it found out that a character and a picture of a multicolor display could be recognized, and this invention was completed.
[0009]A two or more layers dichroism pigment layer which consists of dichroism pigments is laminated like Claim 1, and the 1st invention attains the above-mentioned purpose with a latent image recording medium recording polarization information which is different in each dichroism pigment layer.
[0010]It may be made to provide two or more said layers which prevent mutual contamination of an up-and-down dichroism pigment layer between dichroism pigment layers of a layer.
[0011]an orienting film and a dichroism pigment layer by which the 2nd invention controls orientation of a dichroism pigment like Claim 3 -- alternation -- and at least 2 sets is laminated by a mutually different color, and a latent image recording medium recording polarization information which is different in said two chromatic nature each pigment layer attains the above-mentioned purpose.
[0012]In said latent image recording medium, it is good also considering said orienting film which controls orientation of a dichroism pigment as a rubbing orienting film.
[0013]The orientation of said dichroism pigment may be made to be carried out by being applied on said rubbing orienting film.
[0014]In said latent image recording medium, said orienting film may be formed from material which prevents mutual contamination of an up-and-down dichroism pigment layer.
[0015]The 3rd invention laminates two or more dichroism pigment layers by which orientation of a dichroism pigment was controlled by a mutually different color like Claim 7,

and attains the above-mentioned purpose with a latent image recording medium recording polarization information which is different in said two chromatic nature each pigment layer.
[0016]It is good also as what added shearing for said dichroism pigment layer to a dichroism pigment, and controlled the orientation.
[0017]An orienting film and two or more sets of hardenability liquid crystal layers containing a dichroism pigment are laminated like Claim 9, and the 4th invention attains the above-mentioned purpose with a latent image recording medium recording polarization information which is different in a layer, respectively.
[0018]Said orienting film is good also as a photo-alignment film.
[0019]Said hardenability liquid crystal is good also as an ultraviolet curing nature liquid crystal or an electron beam hardenability liquid crystal.
[0020]It may be made for the spectral characteristics of said dichroism pigment to differ for each class in said latent image recording medium.
[0021]In said latent image recording medium, it is good also as either among yellow, magenta, and cyanogen in a color of a dichroism pigment in said two or more layers.
[0022]A process of the 1st invention of this method applying a dichroism pigment on a substrate like Claim 14, and forming a dichroism pigment layer, A process which adds shearing to said dichroism pigment layer and to which orientation of the dichroism pigment molecule is carried out anisotropically is repeated for every dichroism pigment molecule of at least two kinds of different colors, The above-mentioned purpose is attained with a manufacturing method of a latent image recording medium recording polarization information which is different in each dichroism pigment layer.
[0023]A process of the 2nd invention of this method applying a dichroism pigment on a substrate like Claim 15, and forming a dichroism pigment layer, A process which adds shearing to said dichroism pigment layer and to which orientation of the dichroism pigment molecule is carried out anisotropically, A process of applying a layer which prevents mutual contamination between dichroism pigment layers laminated to said dichroism pigment layer by which orientation was carried out anisotropically, It becomes by ******, these processes are repeated for every dichroism pigment molecule of at least two kinds of different colors, and the above-mentioned purpose is attained with a manufacturing method of a latent image recording medium recording polarization information which is different in each dichroism pigment layer.
[0024]A process at which the 3rd invention of this method applies on a substrate an orienting film which has a function to prevent mutual contamination of a dichroism pigment layer like Claim 16, A process of carrying out orientation treatment of the orienting film by rubbing, and a process of applying a dichroism pigment and forming a dichroism pigment layer on this orienting film by which orientation treatment was carried out, It becomes by ****** and the above-mentioned purpose is attained with a manufacturing method of a latent image recording medium recording polarization information which repeats these processes for every dichroism pigment molecule of at least two kinds of different colors, and is different in each dichroism pigment layer.
[0025]A process at which the 4th invention of this method applies a photo-alignment film on a substrate like Claim 17, A process of patterning by a photo-alignment film irradiating with linear polarization or slanting unpolarized light of wavelength which reveals orientation performance via a photo mask, A process of applying a hardenability liquid crystal containing a dichroism pigment, and a process which stiffens a hardenability liquid crystal by ultraviolet rays or electron beam irradiation, It becomes by ****** and the above-mentioned purpose is repeatedly attained with a manufacturing method of a latent image recording medium recording polarization information which is different in a hardenability liquid crystal containing each dichroism pigment for every hardenability liquid crystal layer which includes these processes for a dichroism pigment of at least two kinds of different colors.

[0026]It may be made for the spectral characteristics of each of said dichroism pigment to differ for each class in a manufacturing method of said latent image recording medium.
[0027]It may be made for a color of a dichroism pigment in said two or more layers to be either among yellow, magenta, and cyanogen in a manufacturing method of said latent image recording medium.
[0028]When it lets a polarizing plate pass or linear polarization is irradiated with and observed, it can make it possible according to this invention, to be able to recognize neither a character nor a picture, when it observes under available light, but to recognize a character and a picture of a multicolor display in a latent image recording medium.
[0029]
[Embodiment of the Invention]Hereafter, the example of an embodiment of the invention is explained in detail.
[0030]As shown in drawing 1, the latent image recording medium 10 concerning the example of this invention comprises the following:
Substrate 11.
The three-layer dichroism pigment layers 14, 16, and 18 formed on this substrate 11.
The mutual contamination prevention layers 15 and 17 formed among the these three layers dichroism pigment layers 14, 16, and 18.
The transparent protective layer 19 formed in the outermost surface.

[0031]The dichroism pigment by which orientation was carried out anisotropically is patterned after said two chromatic nature each pigment layer, and in drawing 1 the lower (substrate 11 side) dichroism pigment layer 14, for example, in the dichroism pigment which assumes a yellow color, drawing 2 is circular -- setting to drawing 2 in the portion of 14A -- horizontal -- anisotropic -- orientation -- it applies and comprises the background parts 14B orientation and by applying anisotropically perpendicularly.
[0032]moreover -- the middle dichroism pigment layer 16 sets the dichroism pigment which assumes a magenta color, for example to drawing 3 in the portion of the triangle 16A of drawing 3 -- horizontal -- anisotropic -- orientation -- it applies and comprises the background parts 16B orientation and by applying anisotropically perpendicularly.
[0033]furthermore -- the outermost (above) dichroism pigment layer 18 is a portion of the quadrangle 18A of drawing 4, and sets the dichroism pigment which assumes a cyan color, for example to drawing 4 -- horizontal -- anisotropic -- orientation -- it applies and comprises the background parts 18B orientation and by applying anisotropically perpendicularly.
[0034]Said dichroism pigment is coloring matter in which the absorbances of the direction which intersects perpendicularly with the major axis direction of a molecule and it differ greatly, When this dichroism pigment is carrying out orientation anisotropically, the ratios of a linearly polarized light component with a light parallel to the direction of a molecule major axis in a specific wavelength (color) field after passing a dichroism pigment layer, and a linearly polarized light component vertical to the direction of a molecule major axis differ greatly, and most former is absorbed.
[0035]Although there are a benzine system, a dianisidine system, a tolidine system, a stilbene series, etc. in the basic structure of a dichroism pigment, various dichroism pigments indicated to "development of the functional dye of the 90s, a market trend, CMC, and p22-29" can be used, for example.
[0036]Specifically, direct colors, such as C.I.Direct Blue 67, C.I.Direct Yellow 12, C.I.Direct Green 59, and C.I.Direct Red 79, can be used as said dichroism pigment.
[0037]A thing transparent as a material of said substrate 11, when a latent image recording medium is a transmission type is desirable, Various plastics, such as polyester, such as cellulose acetate, polyethylene terephthalate, polyethylenenaphthalate, etc. besides inorganic substances, such as glass and quartz, polyimide, and polyethylene, can be used. It is possible

to use for a reflection type latent image recording medium (after-mentioned) what covered the metallic oxide and the metal thin film with high reflective power to the above-mentioned base material surface.

[0038]The hardening resin of acrylic or an epoxy system, etc. are used as said mutual contamination prevention layers 15 and 17. As the transparent protective layer 19 formed in the outermost surface, a transparent resin layer, for example, the hardening resin of acrylic or an epoxy system, is used. The method of carrying out orientation of the dichroism pigment anisotropically is mentioned later.

[0039]As mentioned above, if the transmission type latent image recording medium 10 produced by laminating the dichroism pigment layers 14, 16, and 18 on the transparent substrate 11 is irradiated with available light from the substrate 11 side, To a polarization component, total of the transmitted light amount of a certain thing is tales doses, and, with the naked eye, as for the transmitted light, a bias cannot recognize pictures, such as said triangle 16A.

[0040]However, since the polarization component of the transmitted light has a bias when the above-mentioned latent image recording medium 10 is observed through the polarizing plate placed in drawing 2 - drawing 4 so that vertical linear polarization might be penetrated, the dichroism pigment layer 14 is circular -- the triangle 16A of 14A and the dichroism pigment layer 16, the quadrangle 18A of the dichroism pigment layer 18, and the backgrounds 14B, 16B, and 18B of each class can assume and recognize B (blue), G (green), R (red), and a different black color, respectively, as shown in drawing 5.

[0041]Y (yellow), M (magenta), and C (cyanogen) which are in complementary color relation to each aforementioned color as shown to drawing 5 by () when it observes here through the polarizing plate of the direction which intersects perpendicularly with the above -- it is recognized as white.

[0042]It can be considered as a reflection type by [of the embodiment of the invention shown in drawing 6] forming [whose 2nd example is] the reflecting layer 12 like the latent image recording medium 10A in the substrate 11. Since other composition is the same as that of said latent image recording medium 10, it uses identical codes for identical parts, and omits explanation.

[0043]In this case, by observing through a polarizing plate or irradiating with linear polarization, although a picture cannot be recognized at all with the naked eye depending on an available light exposure like the above, the dichroism pigment layer 14 is circular -- the triangle 16A of 14A and the dichroism pigment layer 16, the quadrangle 18A of the dichroism pigment layer 18, and the backgrounds 14B, 16B, and 18B of each class can assume and recognize a respectively different color.

[0044]As the method of carrying out orientation of the dichroism pigment anisotropically, The method (JP,48-88946,A, JP,52-2293,A) of applying a dichroism pigment on the substrate in which orientation treatment was carried out by rubbing and the vacuum diagonal vapor deposition method, the method (JP,49-16446,A) of carrying out rubbing treatment of the applied dichroism pigment layer, etc. are known. In these methods, in order to record the latent image of a character or a picture on a dichroism pigment layer, the orientation treatment of multiple times is needed by a masked work etc.

[0045]The above orienting films used for this invention have a desirable thing with the function to prevent mutual contamination of a dichroism pigment layer, for example, the polyimide system liquid crystal orientation film used for manufacture of a liquid crystal display can be used. In this case, although said orienting film can serve as said mutual contamination prevention layers 15 and 17, the orienting film 13 which controls the orientation of the dichroism pigment layer 14 is needed like the latent image recording medium 10B of the 3rd example of the embodiment of the invention shown in drawing 7.

[0046]Next, the example of the embodiment using a hardenability liquid crystal layer is

explained.
[0047]As shown in drawing 8, the latent image recording medium 20 concerning the 4th example of this invention comprises the following:
Substrate 11.
The hardenability liquid crystals 24, 26, and 28 containing the dichroism pigment of three layers formed on this substrate 11.
The hardenability liquid crystals 24, 26, and 28 of these three layers are each the photo-alignment films 23, 25, and 27 formed in the substrate 11 side.
The transparent protective layer 19 formed in the outermost surface.

[0048]After carrying out orientation treatment of said hardenability liquid crystals 24, 26, and 28 respectively by the photo-alignment films 23, 25, and 27, The hardenability liquid crystal 24 which is hardened by ultraviolet rays or electron beam irradiation, and contains the lower (substrate 11 side) dichroism pigment in drawing 8, for example, drawing 9 is circular including the dichroism pigment which assumes a yellow color -- in the portion of 24A, in drawing 9, orientation is carried out anisotropically horizontally, orientation is carried out anisotropically perpendicularly and the background parts 24B are consisted of.
[0049]Including the dichroism pigment which assumes a magenta color, for example, in drawing 10, orientation of the middle hardenability liquid crystal 26 is carried out anisotropically horizontally, orientation of it is carried out anisotropically perpendicularly, and it is constituted from the background parts 26B in the portion of the triangle 26A of drawing 10.
[0050]Including the dichroism pigment which assumes a cyan color, for example, the hardenability liquid crystal 28 containing the outermost (above) dichroism pigment is a portion of the quadrangle 28A of drawing 11, and in drawing 11, orientation of it is carried out anisotropically horizontally, and it is constituted by carrying out orientation perpendicularly anisotropically by the background parts 28B.
[0051]The hardenability liquid crystal used for this invention has C=C double bonds, such as an acrylic group and an methacrylic group, in intramolecular, and by electron beam irradiation. Or a photopolymerization initiator can be added and various hardenability liquid crystals which should just be crystals in which a radical polymerization is possible, for example, are indicated by UV irradiation to "Haruyoshi Takatsu, Hiroshi Hasebe, Japanese Liquid Crystal Society, liquid crystal Vol.3 No.1, p34-42" (1999) can be used.
[0052]The method of carrying out orientation of the liquid crystal anisotropically is the same as the method of carrying out orientation of the above-mentioned dichroism pigment anisotropically, and explains the example in the column of working example.
[0053]An orienting film photoisomerizes the orienting film used for the orientation of a hardenability liquid crystal by the linear polarization of wavelength or the slanting unpolarized light exposure which causes a photochemical reaction, What is necessary is just what generates anisotropy on the surface by one of reactions among photodimerization, Kokan-izing, optical bridge construction, photolysis, and photolysis-combination, For example, "Masaki Hasegawa, Japanese Liquid Crystal Society, Vol.3 No.1, p3 (1999)" and various photo-alignment films indicated to "Yasumasa Takeuchi, Japanese Liquid Crystal Society, Vol.3 No.4, p262 (1999)" can be used.
[0054]The dichroism pigments used for this invention should just be said hardenability liquid crystal and a dichroism pigment with compatibility, for example, various dichroism pigments indicated to "development of the functional dye of the 90s, a market trend, CMC, and P10-21" can be used for them.
[0055]As mentioned above, if the transmission type latent image recording medium 20 produced on the transparent substrate 11 by laminating the hardenability liquid crystal layers 24, 26, and 28 containing a dichroism pigment is irradiated with available light from the

substrate 11 side, To a polarization component, total of the transmitted light amount of a certain thing is tales doses, and, with the naked eye, as for the transmitted light, a bias cannot identify pictures, such as said triangle 26A.
[0056]However, since the polarization component of the transmitted light has a bias when the above-mentioned latent image recording medium 10 is observed through the polarizing plate placed in drawing 9 - drawing 11 so that vertical linear polarization might be penetrated, the hardenability liquid crystal 24 containing a dichroism pigment is circular -- as shown in drawing 12, the triangle 26A of the hardenability liquid crystal 26 containing 24A and a dichroism pigment, the quadrangle 28A of the hardenability liquid crystal 28 containing a dichroism pigment, and the backgrounds 24B, 26B, and 28B of each class, Respectively, blue, green, red, and a different black color can be assumed and identified.
[0057]Here, if it observes through the polarizing plate of the direction which intersects perpendicularly with the above, as shown to drawing 12 by (), it will be recognized as the yellow, the magenta, cyanogen, and white which are in complementary color relation to each aforementioned color.
[0058]Like the latent image recording medium 20A concerning the 5th example of the embodiment of the invention shown in drawing 13, it can be considered as a reflection type by forming the reflecting layer 12 on the substrate 11. Since other composition is the same as that of said latent image recording medium 20, it uses identical codes for identical parts, and omits explanation.
[0059]In this case, although a picture cannot be recognized at all with the naked eye depending on an available light exposure like the above, the hardenability liquid crystal 24 which contains a dichroism pigment in observing through a polarizing plate or irradiating with linear polarization is circular -- with the triangle 26A of the hardenability liquid crystal 26 containing 24A and a dichroism pigment, and the quadrangle 28A of the hardenability liquid crystal 28 containing a dichroism pigment. The backgrounds 24B, 26B, and 28B of each class can assume and identify a respectively different color.
[0060]The latent image recording media 10, 10A, 10B, 20, and 20A concerning the example of the above-mentioned embodiment, Although it has the three-layer dichroism pigment layers 14, 16, and 18 formed on the substrate 11, the mutual contamination prevention layers 15 and 17, and the protective layer 19 of the outermost surface, or it has the hardenability liquid crystals 24, 26, and 28 of three layers, and the photo-alignment films 23, 25, and 27 and it is constituted, This invention is not limited to this, a dichroism pigment layer or a hardenability liquid crystal layer, and the photo-alignment film should just be more than two-layer, and if the endurance of a dichroism pigment layer or a hardenability liquid crystal layer is enough, it is not necessary to necessarily form the protective layer 19 of the outermost surface.
[0061]
[Example]Hereafter, although working example of this invention is described, this invention is not limited to these working example.
[0062](Working example 1) The pure water of 1 weight-section ****** 89 weight section is added for the Nonion system surface-active agent emulgen 108 (Made by Kao) to ten weight sections, and let dichroism pigment C.I.Direct Blue 67 be solution. applying this by a spin coater on glass (substrate) -- a room temperature -- after natural seasoning and a law -- rubbing treatment was perpendicularly performed [the right half] for the left half horizontally by the method (the 1st layer).
[0063]in order to prevent mutual contamination of a dichroism pigment -- epoxy system overcoat material AC1 -- 5100 (product made from Nissan Chemicals) was applied and calcinated by the spin coater, and the mutual contamination prevention layer was formed.
[0064]The pure water of 1 weight-section ****** 89 weight section is added for the Nonion system surface-active agent emulgen 108 to ten weight sections, and let dichroism pigment

C.I.Direct Yellow 12 be solution. applying this by a spin coater on the mutual contamination prevention layer formed on the previous substrate -- a room temperature -- after natural seasoning and a law -- rubbing treatment was perpendicularly performed [the upper half] for the lower half horizontally by the method (the 2nd layer).
[0065]In this way, although the obtained latent image recording medium was assuming gray under available light, four fields which assume white, black, blue, and yellow as observing through the polarizing plate placed so that vertical linear polarization might be penetrated, or irradiating with and observing vertical linear polarization have been recognized (refer to drawing 14). If linear polarization is irradiated with and observed through the polarizing plate of the polarization axis which intersects perpendicularly with the above, as () shows, the above and the color of complementary color relation can be recognized to drawing 14.
[0066](Working example 2) It calcinated by applying polyimide system orienting film SE-7492 (product made from Nissan Chemicals) by a spin coater by using glass as a substrate. next, a right half -- a perpendicular direction -- a left half -- horizontal -- a law -- rubbing treatment was performed by the method.
[0067]The pure water of 1 weight-section ****** 89 weight section is added for the Nonion system surface-active agent emulgen 108 to 10 weight, and let dichroism pigment C.I.Direct Blue 67 be solution. This was applied by the spin coater on the rubbing orienting film formed on the previous substrate, and it air-dried at the room temperature (the 1st layer).
[0068]Polyimide system orienting film SE-7492 was further applied by the spin coater on this substrate, and it calcinated similarly. next, an upper half -- a perpendicular direction -- a lower half -- horizontal -- a law -- ** Rira Byng processing was carried out to the method.
[0069]The pure water of 1 weight-section ****** 89 weight section is added for the Nonion system surface-active agent emulgen 108 to ten weight sections, and let dichroism pigment C.I.Direct Yellow 12 be solution. This was applied by the spin coater on the rubbing orienting film formed on the previous substrate, and it air-dried at the room temperature (the 2nd layer).
[0070]In this way, although the obtained latent image recording medium was assuming gray under available light, if it was observed through the polarizing plate or linear polarization was irradiated with and observed, it has recognized four fields which assume white, black, blue, and yellow like the above.
[0071](Working example 3) Dichroism pigment C.I.Direct Green 59 Five weight sections, C. The pure water of 1 weight-section ****** 89 weight section was added for the Nonion system surface-active agent emulgen 108 (Made by Kao) to five weight sections, I.Direct Red 79 was used as solution, and the dichroism pigment solution 1 which assumes a yellow color was obtained.
[0072]Next, five weight sections and C.I.Direct Red 79 were added for dichroism pigment C.I.Direct Blue 67, the pure water of 1 weight-section ****** 89 weight section was added for the Nonion system surface-active agent emulgen 108 to five weight sections, it was considered as solution, and the dichroism pigment solution 2 which assumes a magenta color was obtained.
[0073]Five weight sections and C.I.Direct Green 59 were added for dichroism pigment C.I.Direct Blue 67, the pure water of 1 weight-section ****** 89 weight section was added for the Nonion system surface-active agent emulgen 108 to five weight sections, it was considered as solution, and the dichroism pigment solution 3 which assumes a cyan color was obtained.
[0074]Using polyimide system orienting film SE-7492 used for working example 2 as an orienting film, formation of an orienting film, the polarization information record by rubbing treatment, and formation of the dichroism pigment layer were repeated about the dichroism pigment solution 1-3, and the latent image recording medium was created.
[0075]In this way, although the obtained latent image recording medium is assuming gray under available light, If it observes through the polarizing plate placed so that vertical linear

polarization might be penetrated or vertical linear polarization is irradiated with and observed, the polarization information recorded on the two chromatic nature each pigment layer will be reproduced by three colors of blue, green, and red.
[0076]If linear polarization use is carried out and it observes, it will reappear by three colors of the polarizing plate set in the direction (horizontal) which intersects perpendicularly with the above or the yellow which is in complementary color relation to the aforementioned color, magenta, and cyanogen.
[0077](Working example 4) The toluene solution (2wt%) of polyvinyl cinnamate was applied by the spin coater on glass (substrate), and the dryer and the 0.1-micrometer-thick dry paint film were obtained at the room temperature.
[0078]After taking out linear polarization through the polarizing filter for ultraviolet rays by having used the ultrahigh pressure mercury lamp as the light source and masking the left half of a substrate, it irradiated with polarization ultraviolet rays horizontal to a right half, next the right half of the substrate was masked and the left half irradiated with vertical polarization ultraviolet rays. Polyvinyl cinnamate causes a dimerization reaction by polarization UV irradiation, and carries out orientation in the direction which intersects perpendicularly with the polarization axis of ultraviolet rays. That is, in the above-mentioned polarization UV irradiation conditions, the right half of the substrate is carrying out orientation of the left half perpendicularly horizontally.
[0079]To ultraviolet curing nature liquid crystal UCL-001-K1 (made by Dainippon Ink & Chemicals, Inc.). dichroism pigment SI-800 (product made from Mitsui Toatsu Chemicals Chemical industry) which assumes a blue color -- 2wt% -- it dissolves, and after applying to the glass substrate which carried out said photo alignment processing by a spin coater, it was made to harden by irradiating with unpolarized ultraviolet rays (the 1st layer)
[0080]Like the 1st layer, the photo-alignment film was applied, vertical polarization UV irradiation was performed for polarization UV irradiation horizontal to an upper half in the lower half, and orientation treatment was performed. Perpendicularly at this time, the upper half of the photo-alignment film is carrying out orientation of the lower half horizontally.
[0081]To ultraviolet curing nature liquid crystal UCL-001-K1 (made by Dainippon Ink & Chemicals, Inc.). dichroism pigment SI-486 (product made from Mitsui Toatsu Chemicals Chemical industry) which assumes a yellow color -- 2wt% -- it dissolves, and after applying to the glass substrate which carried out said photo alignment processing by a spin coater, it was made to harden by irradiating with unpolarized ultraviolet rays (the 2nd layer)
[0082]In this way, although the obtained latent image recording medium is assuming gray under available light, If it observed through the polarizing plate placed so that vertical linear polarization might be penetrated in a figure or vertical linear polarization was irradiated with and observed, as shown in drawing 14 like the case of working example 1, four fields which present white, black, blue, and yellow have been recognized. If linear polarization is irradiated with and observed through the polarizing plate of the polarization axis which intersects perpendicularly with the above, as () shows, the above and the color of complementary color relation can be recognized to drawing 14.
[0083](Working example 5) To ultraviolet curing nature liquid crystal UCL-001-K1 (made by Dainippon Ink & Chemicals, Inc.). Dichroism pigment SI-486 which assumes a yellow color (product made from Mitsui Toatsu Chemicals Chemical industry), dichroism pigment SI-497 (product made from Mitsui Toatsu Chemicals Chemical industry) which assumes the dichroism pigment M-86 (product made from Mitsui Toatsu Chemicals Chemical industry) which assumes a magenta color, and a cyan color -- respectively -- 2wt% -- it dissolved and the hardenability liquid crystals 1, 2, and 3 containing a dichroism pigment were obtained.
[0084]The multilayer polarizing element was repeatedly created about the hardenability liquid crystals 1-3 which include spreading of a photo-alignment film, the orientation treatment by polarization UV irradiation, spreading of the hardenability liquid crystal containing a

dichroism pigment, and hardening of the hardenability liquid crystal by unpolarized UV irradiation for a dichroism pigment like working example 4.
[0085]In this way, although the obtained latent image recording medium is assuming gray under available light, If it observes through the polarizing plate placed so that vertical linear polarization might be penetrated or vertical linear polarization is irradiated with and observed, the polarization information recorded on each hardenability liquid crystal layer will be reproduced by three colors of blue, green, and red, and a background will become black.
[0086]If it observes using the polarizing plate or linear polarization of a direction (horizontal) which intersects perpendicularly with the above, it will reappear by three colors of yellow, magenta, and cyanogen which are in complementary color relation to the aforementioned color, and a background will become white.
[0087]
[Effect of the Invention]Since this invention constituted the latent image recording medium as mentioned above, when it observes under available light, neither a character nor a picture can be recognized, but when it lets a polarizing plate pass or linear polarization is irradiated with and observed, it has the outstanding effect that the character and picture of a multicolor display can be recognized.

TECHNICAL FIELD

[Field of the Invention]When this invention starts a latent image recording medium and a manufacturing method for the same and it observes under available light especially, can recognize neither a character nor a picture, but. When the time of observing through a polarizing plate and linear polarization are irradiated with and observed, it is related with a latent image recording medium which can recognize the character and picture of a multicolor display, and a manufacturing method for the same.

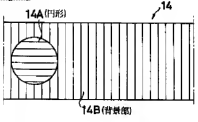
PRIOR ART

[Description of the Prior Art]In order to enable it to recognize although neither a character nor a picture can be recognized under available light only after there is a special stimulus from the outside, such as ultraviolet rays and polarization, The method of using the multiaxial polarizing element using the dichroism pigment indicated to printing and JP,H7-261024,A of fluorescent ink, and JP,H9-183287,A is known.
[0003]Said fluorescent ink is ink which absorbs ultraviolet rays and generates visible light, and is used for ROTSU ******, distribution management, etc. of goods. The multiaxial light polarizer using said dichroism pigment is the method that a character and a picture can be recognized for the first time, by irradiating with linear polarization.
The application to goods, the forgery prevention use of a security, the discriminating method of an authentic article, etc. is proposed.

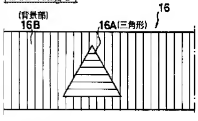
DRAWINGS

[Drawing 1]

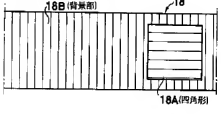
[Drawing 2]



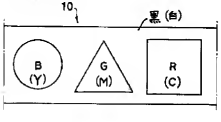
[Drawing 3]



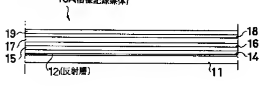
[Drawing 4]



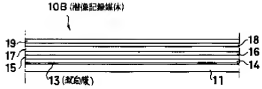
[Drawing 5]



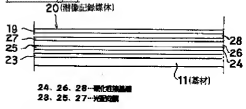
[Drawing 6]



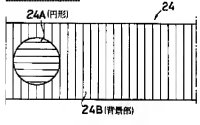
[Drawing 7]



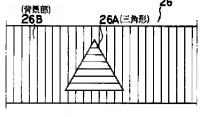
[Drawing 8]



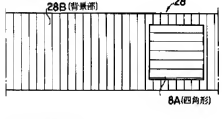
[Drawing 9]



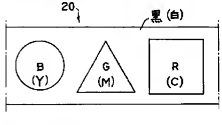
[Drawing 10]



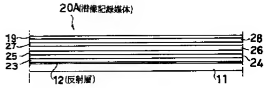
[Drawing 11]



[Drawing 12]



[Drawing 13]



[Drawing 14]